NON-CATALOG

Surface Mount

Frequency Mixer

LRMS-2+

Level 7 (LO Power +7dBm) 5 to 1000 MHz

CASE STYLE: QQQ130

+RoHS Compliant
The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

Maximum Ratings

Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power	50mW
IF Current	40mA

Permanent damage may occur if any of these limits are exceeded.

Pin Connections

LO	1
RF	4
IF	5
GROUND	2,3,6

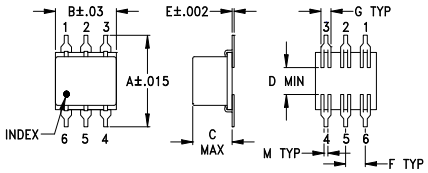
Features

- low conversion loss, 6.67 dB typ.
- excellent L-R isolation, 40 dB typ.

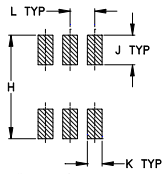
Applications

- VHF/UHF
- instrumentation
- cellular

Outline Drawing



PCB Land Pattern



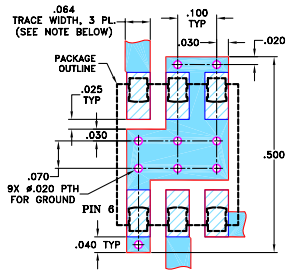
Suggested Layout,
Tolerance to be within ±.002

Outline Dimensions (inch / mm)

A	B	C	D	E	F	G
.400	.31	.200	.10	.010	.100	.050
10.16	7.87	5.08	2.54	0.25	2.54	1.27

H	J	K	L	M		wt
.420	.120	.060	.100	.020		grams
10.67	3.05	1.52	2.54	0.51		0.55

Demo Board MCL P/N: TB-44+
Suggested PCB Layout (PL-083)



NOTES: 1.TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS 0.030" ± 0.002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2.BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)
DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

Electrical Specifications

FREQUENCY (MHz)		CONVERSION LOSS (dB)				LO-RF ISOLATION (dB)						LO-IF ISOLATION (dB)						IP3 at center band (dBm)
		Mid-Band m			Total Range	L		M		U		L		M		U		
LO/RF f_L-f_U	IF	$\overline{X}$	σ	Max.	Max.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.
5-1000	DC-1000	6.67	.26	8.0	9.5	60	40	40	20	25	18	55	30	30	20	20	12	16

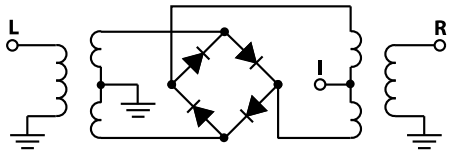
1 dB COMP.: +1 dBm typ.

L = low range [f_L to 10 f_L]
m= mid band [$2f_L$ to $f_U/2$]
M = mid range [10 f_L to $f_U/2$]
U = upper range [$f_U/2$ to f_U]

Typical Performance Data

Frequency (MHz)		Conversion Loss (dB)	Isolation L-R (dB)	Isolation L-I (dB)	VSWR RF Port (:1)	VSWR LO Port (:1)
RF	LO	LO +7dBm	LO +7dBm	LO +7dBm	LO +7dBm	LO +7dBm
5.00	35.00	7.10	54.80	61.28	1.65	2.68
10.00	40.00	6.75	53.66	60.10	1.39	2.70
34.00	64.00	6.65	49.48	56.02	1.28	2.69
42.00	72.00	6.71	48.42	54.85	1.29	2.68
50.00	80.00	6.65	47.48	53.84	1.30	2.65
75.00	105.00	6.64	45.18	51.63	1.31	2.61
100.00	130.00	6.75	43.57	50.79	1.31	2.68
200.00	230.00	6.76	38.78	47.49	1.32	2.76
250.00	280.00	6.77	37.05	44.64	1.34	2.60
300.00	330.00	6.83	35.93	42.49	1.32	2.72
400.00	430.00	6.97	34.39	38.85	1.30	2.70
450.00	480.00	6.93	33.35	36.67	1.30	2.67
500.00	530.00	7.05	32.80	35.07	1.29	2.83
550.00	580.00	7.12	31.89	32.96	1.29	2.91
600.00	630.00	7.08	31.55	31.69	1.29	2.60
700.00	730.00	7.06	30.41	29.33	1.26	2.90
750.00	780.00	7.16	29.49	27.72	1.31	2.89
800.00	830.00	7.08	28.87	26.26	1.38	3.38
900.00	930.00	6.95	27.66	22.68	1.65	3.59
1000.00	1030.00	7.11	27.40	21.43	1.80	3.96

Electrical Schematic



Notes
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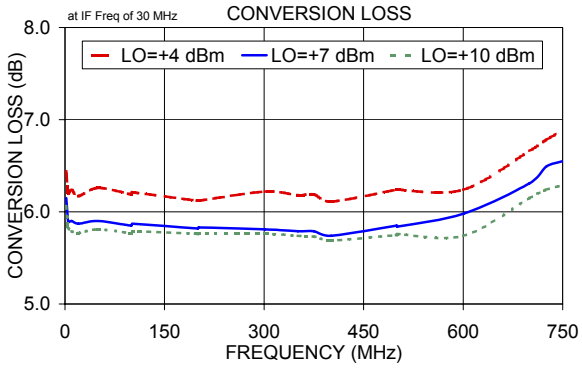
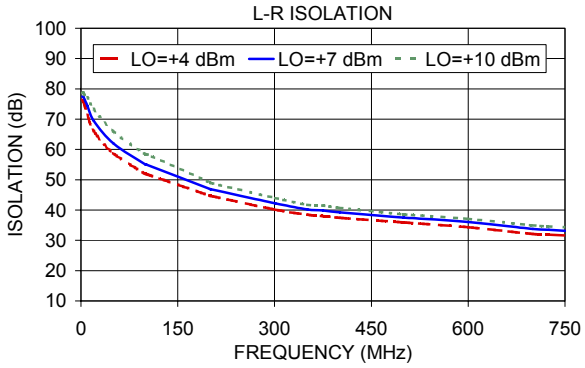
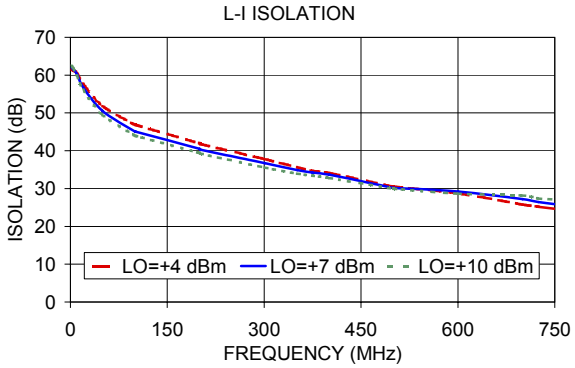
NON-CATALOG

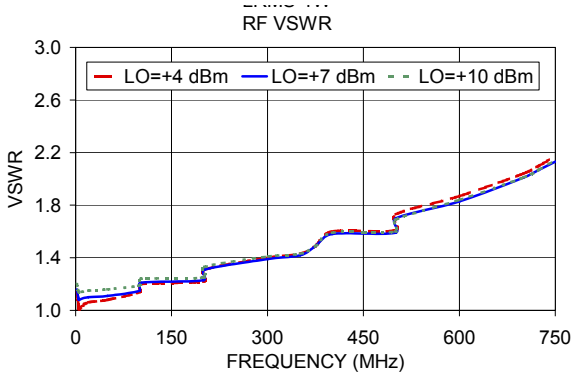
Performance Charts

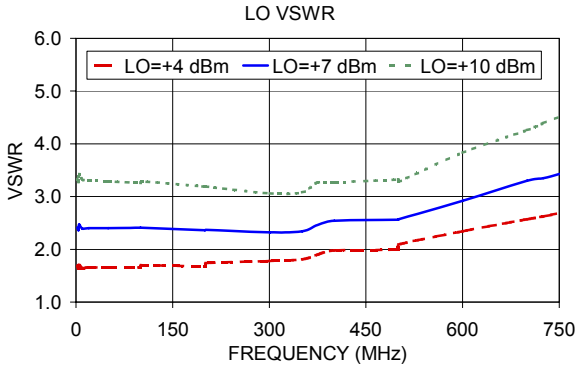
LRMS-2+

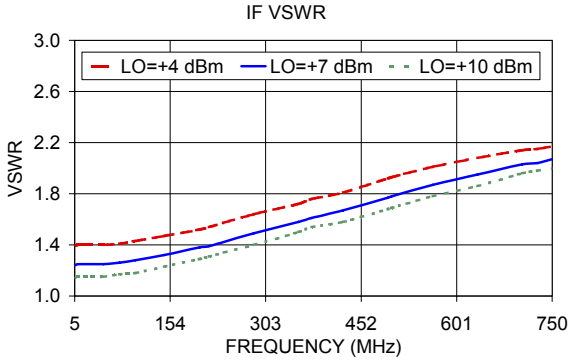












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Frequency Mixer LRMS-2+

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=30MHz (dB) @LO (dBm)		
		+4	+7	+10
5.0	35.0	7.36	6.93	6.73
10.0	40.0	7.46	7.00	6.77
50.1	80.1	7.31	6.87	6.66
90.1	120.1	7.34	6.95	6.77
130.1	160.1	7.37	6.98	6.82
170.1	200.1	7.36	7.04	6.87
210.1	240.1	7.34	7.01	6.86
250.1	280.1	7.36	7.06	6.88
290.1	320.1	7.38	7.03	6.86
330.1	360.1	7.43	7.11	6.93
370.1	400.1	7.48	7.15	6.93
410.1	440.1	7.56	7.14	6.98
450.1	480.1	7.53	7.22	6.98
490.1	520.1	7.56	7.18	6.98
530.1	560.1	7.57	7.14	6.92
570.1	600.1	7.56	7.17	6.94
610.1	640.1	7.64	7.25	7.02
650.1	680.1	7.74	7.36	7.12
690.1	720.1	7.80	7.40	7.15
730.1	760.1	7.84	7.39	7.16
750.1	780.1	7.85	7.41	7.11
790.1	820.1	7.99	7.45	7.16
810.1	840.1	8.07	7.52	7.19
850.1	880.1	8.26	7.68	7.31
870.1	900.1	8.38	7.78	7.37
910.1	940.1	8.55	7.93	7.51
930.1	960.1	8.61	7.97	7.58
970.1	1000.1	8.79	8.22	7.81
990.1	1020.1	8.86	8.31	7.84
1050.1	1080.1	9.10	8.61	8.24
1090.1	1120.1	9.18	8.78	8.46
1110.1	1140.1	9.23	8.81	8.49
1150.1	1180.1	9.37	8.97	8.72
1170.1	1200.1	9.39	9.05	8.81
1210.1	1240.1	9.51	9.14	8.94
1230.1	1260.1	9.62	9.28	9.08
1270.1	1300.1	9.81	9.43	9.28
1290.1	1320.1	9.88	9.56	9.46
1330.1	1360.1	10.14	9.87	9.75
1350.1	1380.1	10.28	9.92	9.87

RF (IN) (MHz)	LO (MHz)	IP3 INPUT (dBm) @LO (dBm)		
		+4	+7	+10
10.1	40.1	18.69	23.41	24.55
50.1	80.1	19.31	18.89	18.14
90.1	120.1	17.00	17.01	22.84
130.1	160.1	17.03	19.38	24.21
170.1	200.1	17.80	23.69	21.11
210.1	240.1	18.58	22.83	20.22
250.1	280.1	18.64	19.52	19.83
290.1	320.1	17.75	17.49	19.02
330.1	360.1	18.30	18.13	18.92
370.1	400.1	16.85	19.83	16.97
410.1	440.1	15.92	18.12	18.73
450.1	480.1	15.45	19.09	18.74
490.1	520.1	15.28	15.28	15.65
530.1	560.1	13.52	14.47	15.68
570.1	600.1	13.92	15.01	15.28
610.1	640.1	15.15	16.42	14.93
650.1	680.1	15.76	17.02	18.15
690.1	720.1	14.92	18.01	16.77
730.1	760.1	15.04	17.82	15.19
750.1	780.1	14.13	16.36	15.98
790.1	820.1	14.26	14.85	15.78
810.1	840.1	13.97	14.27	14.18
850.1	880.1	12.87	13.59	14.01
870.1	900.1	12.50	12.86	13.55
910.1	940.1	11.98	12.89	12.64
930.1	960.1	12.23	14.08	12.51
970.1	1000.1	10.88	12.51	10.92
990.1	1020.1	10.84	12.38	10.66
1030.1	1060.1	10.93	11.51	10.92
1050.1	1080.1	10.52	11.54	11.37
1090.1	1120.1	11.15	11.68	12.39
1110.1	1140.1	11.72	12.37	13.76
1150.1	1180.1	12.13	13.39	15.05
1170.1	1200.1	12.06	12.91	15.11
1210.1	1240.1	11.75	12.54	13.09
1230.1	1260.1	11.39	12.34	12.92
1270.1	1300.1	10.73	11.98	13.13
1290.1	1320.1	10.53	12.13	12.12
1330.1	1360.1	10.62	11.83	12.87
1350.1	1380.1	10.47	12.10	12.59

RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+1dBm (dB) @LO (dBm)		
		+4	+7	+10
10.1	40.1	0.83	0.70	0.41
50.1	80.1	0.89	0.64	0.41
90.1	120.1	0.99	0.57	0.41
130.1	160.1	0.86	0.73	0.45
170.1	200.1	0.91	0.60	0.47
210.1	240.1	0.85	0.60	0.42
250.1	280.1	0.88	0.62	0.46
290.1	320.1	0.93	0.64	0.49
330.1	360.1	0.89	0.71	0.55
370.1	400.1	0.95	0.66	0.60
410.1	440.1	1.03	0.61	0.61
450.1	480.1	0.99	0.73	0.59
490.1	520.1	1.11	0.85	0.62
530.1	560.1	1.09	0.74	0.65
570.1	600.1	1.18	0.83	0.74
610.1	640.1	1.06	0.90	0.66
650.1	680.1	1.36	1.02	0.85
690.1	720.1	1.36	0.96	0.79
730.1	760.1	1.38	1.03	0.88
750.1	780.1	1.41	1.08	0.93
790.1	820.1	1.36	1.13	0.95
810.1	840.1	1.47	1.33	1.12
850.1	880.1	1.43	1.26	1.12
870.1	900.1	1.39	1.11	1.09
910.1	940.1	1.40	1.24	1.18
930.1	960.1	1.28	1.14	0.95
970.1	1000.1	1.36	1.31	1.22
990.1	1020.1	1.44	1.10	1.15
1030.1	1060.1	1.29	0.98	0.97
1050.1	1080.1	1.26	1.00	0.85
1090.1	1120.1	1.23	0.89	0.87
1110.1	1140.1	1.18	0.90	0.85
1150.1	1180.1	1.22	0.92	0.81
1170.1	1200.1	1.18	0.98	0.87
1210.1	1240.1	1.21	0.80	0.84
1230.1	1260.1	1.18	0.95	0.77
1270.1	1300.1	1.22	0.95	0.72
1290.1	1320.1	1.12	0.87	0.72
1330.1	1360.1	1.34	0.83	0.69
1350.1	1380.1	1.18	0.75	0.68

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Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=500.1MHz (dB) @LO (dBm) +7
490.0	10.1	7.16
477.7	22.4	7.17
465.4	34.7	7.15
453.1	47.0	7.14
440.8	59.3	7.15
428.5	71.6	7.12
416.2	83.9	7.08
403.8	96.3	7.06
391.5	108.6	7.06
379.2	120.9	7.04
366.9	133.2	6.99
354.6	145.5	6.99
342.3	157.8	7.00
330.0	170.1	6.98
317.7	182.4	6.99
305.4	194.7	6.98
293.1	207.0	6.98
280.8	219.3	6.97
268.5	231.6	6.96
256.2	243.9	6.98
243.8	256.3	6.92
231.5	268.6	6.88
219.2	280.9	6.88
206.9	293.2	6.98
194.6	305.5	6.96
182.3	317.8	6.96
170.0	330.1	6.97
157.7	342.4	6.93
145.4	354.7	6.98
133.1	367.0	6.99
120.8	379.3	7.01
108.5	391.6	6.99
96.2	403.9	7.01
83.8	416.3	7.00
71.5	428.6	7.04
59.2	440.9	7.04
46.9	453.2	7.04
34.6	465.5	7.07
22.3	477.8	7.10
10.0	490.1	7.21

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=10.1MHz (dB) @LO (dBm) +7
10.0	20.1	6.84
30.2	40.3	6.50
50.4	60.5	6.55
70.6	80.7	6.54
90.8	100.9	6.54
111.0	121.1	6.53
131.2	141.3	6.52
151.4	161.5	6.62
171.6	181.7	6.60
191.8	201.9	6.65
212.0	222.1	6.63
232.2	242.3	6.70
252.4	262.5	6.73
272.7	282.8	6.72
292.9	303.0	6.79
313.1	323.2	6.81
333.3	343.4	6.83
353.5	363.6	6.83
373.7	383.8	6.90
393.9	404.0	6.94
434.3	444.4	6.97
454.5	464.6	7.00
494.9	505.0	7.02
515.1	525.2	7.05
555.5	565.6	7.08
575.7	585.8	7.14
616.1	626.2	7.22
636.3	646.4	7.24
676.7	686.8	7.26
696.9	707.0	7.26
737.3	747.4	7.25
757.6	767.7	7.25
798.0	808.1	7.33
818.2	828.3	7.37
858.6	868.7	7.47
878.8	888.9	7.62
919.2	929.3	7.70
939.4	949.5	7.78
979.8	989.9	7.95
1000.0	1010.1	7.97

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=1000.1MHz (dB) @LO (dBm) +7
990.0	10.1	8.23
970.0	30.1	8.18
950.0	50.1	8.17
930.0	70.1	8.15
910.0	90.1	8.10
890.0	110.1	8.06
870.0	130.1	8.00
850.0	150.1	7.99
830.0	170.1	7.96
810.0	190.1	7.93
790.0	210.1	7.91
770.0	230.1	7.88
750.0	250.1	7.83
730.0	270.1	7.84
710.0	290.1	7.84
690.0	310.1	7.80
670.0	330.1	7.79
650.0	350.1	7.79
630.0	370.1	7.77
610.0	390.1	7.76
570.0	430.1	7.73
550.0	450.1	7.72
510.0	490.1	7.72
490.0	510.1	7.66
450.0	550.1	7.67
430.0	570.1	7.69
390.0	610.1	7.67
370.0	630.1	7.70
330.0	670.1	7.68
310.0	690.1	7.66
270.0	730.1	7.68
250.0	750.1	7.70
210.0	790.1	7.68
190.0	810.1	7.71
150.0	850.1	7.78
130.0	870.1	7.78
90.0	910.1	7.92
70.0	930.1	7.96
30.0	970.1	8.15
10.0	990.1	8.68

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Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB) @LO (dBm)			LO-IF ISOLATION (dB) @LO (dBm)		
	+4	+7	+10	+4	+7	+10
5.0	63.51	67.42	71.51	54.09	57.23	60.91
10.0	62.56	66.49	69.85	53.93	56.87	60.05
50.1	57.23	56.64	56.89	52.64	52.46	51.99
90.1	52.27	51.94	51.91	48.43	47.49	47.10
130.1	48.86	48.98	48.78	45.22	44.73	44.27
170.1	46.75	46.80	46.74	43.14	42.72	42.32
210.1	45.01	45.05	45.02	41.65	41.19	40.66
250.1	43.67	43.71	43.73	40.55	39.85	39.21
290.1	42.49	42.54	42.62	39.38	38.66	37.97
330.1	41.40	41.54	41.63	38.22	37.31	36.60
370.1	40.59	40.78	40.84	36.87	35.98	35.32
410.1	39.69	39.92	40.04	35.64	34.81	34.18
450.1	38.62	38.90	39.09	34.26	33.51	32.90
490.1	37.66	37.94	38.13	32.99	32.36	31.92
530.1	36.99	37.34	37.57	31.62	30.95	30.54
570.1	36.36	36.70	36.94	30.53	29.86	29.34
610.1	35.92	36.24	36.46	29.38	28.82	28.28
650.1	35.39	35.59	35.72	28.32	27.91	27.49
690.1	34.90	34.98	35.02	27.23	26.95	26.66
730.1	34.20	34.16	34.08	25.88	25.68	25.48
750.1	34.07	34.01	33.91	25.41	25.20	25.02
790.1	33.48	33.40	33.24	24.32	24.11	23.91
810.1	33.08	32.99	32.78	23.80	23.59	23.38
850.1	32.42	32.40	32.21	22.82	22.66	22.44
870.1	32.14	32.19	32.06	22.46	22.33	22.10
910.1	31.41	31.54	31.45	21.36	21.32	21.13
930.1	31.10	31.30	31.27	20.98	20.99	20.84
970.1	30.63	30.93	31.05	20.10	20.20	20.11
990.1	30.36	30.69	30.87	19.71	19.87	19.83
1050.1	29.99	30.54	31.06	18.49	18.76	18.81
1090.1	29.96	30.62	31.33	17.65	17.98	18.06
1110.1	29.91	30.67	31.50	17.31	17.66	17.74
1150.1	30.00	30.99	32.11	16.59	17.01	17.11
1170.1	30.02	31.11	32.34	16.24	16.70	16.82
1210.1	30.56	32.03	33.60	15.45	15.90	16.06
1230.1	30.87	32.67	34.58	15.18	15.64	15.78
1270.1	31.78	34.28	36.84	14.42	14.92	15.08
1290.1	32.48	35.54	38.63	14.20	14.68	14.82
1330.1	34.41	39.38	44.28	13.43	13.95	14.09
1350.1	34.60	40.71	48.16	13.15	13.71	13.89

RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB) @LO (dBm)		
		+4	+7	+10
10.1	40.1	39.34	29.58	45.35
50.1	80.1	37.57	35.29	35.47
90.1	120.1	31.64	31.66	31.76
130.1	160.1	29.26	29.05	28.98
170.1	200.1	27.02	27.33	27.10
210.1	240.1	25.80	25.89	25.96
250.1	280.1	24.94	25.07	24.96
290.1	320.1	24.43	24.39	24.36
330.1	360.1	23.88	24.04	24.04
370.1	400.1	23.54	23.77	23.77
410.1	440.1	23.34	23.55	23.67
450.1	480.1	23.31	23.54	23.78
490.1	520.1	23.19	23.46	23.75
530.1	560.1	22.91	23.27	23.51
570.1	600.1	22.01	22.34	22.57
610.1	640.1	20.76	21.01	21.14
650.1	680.1	19.26	19.39	19.50
690.1	720.1	17.75	17.82	17.83
730.1	760.1	16.54	16.53	16.52
750.1	780.1	15.98	15.97	15.93
790.1	820.1	15.07	15.07	15.06
810.1	840.1	14.65	14.62	14.65
850.1	880.1	13.99	14.00	14.06
870.1	900.1	13.69	13.73	13.80
910.1	940.1	13.23	13.30	13.41
930.1	960.1	13.03	13.11	13.26
970.1	1000.1	12.71	12.84	13.03
990.1	1020.1	12.62	12.78	13.01
1030.1	1060.1	12.46	12.70	13.00
1050.1	1080.1	12.39	12.69	13.04
1090.1	1120.1	12.39	12.78	13.24
1110.1	1140.1	12.37	12.82	13.30
1150.1	1180.1	12.34	12.87	13.37
1170.1	1200.1	12.39	12.93	13.41
1210.1	1240.1	12.43	12.95	13.35
1230.1	1260.1	12.37	12.88	13.27
1270.1	1300.1	12.31	12.75	13.04
1290.1	1320.1	12.28	12.67	12.93
1330.1	1360.1	12.07	12.41	12.57
1350.1	1380.1	11.92	12.22	12.32

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Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1) @LO (dBm)		
		+4	+7	+10
5.0	35.0	1.72	2.44	3.27
10.0	40.0	1.68	2.37	3.24
50.1	80.1	1.27	1.38	1.43
90.1	120.1	1.20	1.28	1.33
130.1	160.1	1.27	1.35	1.39
170.1	200.1	1.20	1.26	1.32
210.1	240.1	1.27	1.34	1.39
250.1	280.1	1.26	1.33	1.37
290.1	320.1	1.27	1.34	1.38
330.1	360.1	1.28	1.34	1.39
370.1	400.1	1.28	1.35	1.40
410.1	440.1	1.31	1.38	1.43
450.1	480.1	1.32	1.39	1.44
490.1	520.1	1.34	1.41	1.46
530.1	560.1	1.37	1.44	1.50
570.1	600.1	1.41	1.48	1.54
610.1	640.1	1.43	1.49	1.56
650.1	680.1	1.50	1.56	1.62
690.1	720.1	1.49	1.56	1.62
730.1	760.1	1.61	1.69	1.75
750.1	780.1	1.62	1.70	1.76
790.1	820.1	1.68	1.76	1.83
810.1	840.1	1.76	1.84	1.91
850.1	880.1	1.81	1.88	1.95
870.1	900.1	1.83	1.90	1.97
910.1	940.1	2.05	2.11	2.17
930.1	960.1	2.09	2.14	2.20
970.1	1000.1	2.22	2.27	2.33
990.1	1020.1	2.37	2.43	2.49
1030.1	1060.1	2.49	2.54	2.59
1050.1	1080.1	2.57	2.63	2.68
1090.1	1120.1	2.89	2.96	3.02
1110.1	1140.1	2.91	2.98	3.05
1150.1	1180.1	3.18	3.27	3.35
1170.1	1200.1	3.33	3.42	3.50
1210.1	1240.1	3.43	3.53	3.60
1230.1	1260.1	3.61	3.73	3.80
1270.1	1300.1	3.76	3.86	3.92
1290.1	1320.1	3.79	3.90	3.96
1330.1	1360.1	4.08	4.19	4.26
1350.1	1380.1	4.10	4.21	4.28

LO (MHz)	LO VSWR (:1) @LO (dBm)		
	+4	+7	+10
5.0	1.30	1.35	1.38
10.0	1.19	1.25	1.29
50.1	1.96	2.79	3.83
90.1	1.94	2.75	3.76
130.1	1.93	2.74	3.73
170.1	1.98	2.78	3.79
210.1	1.97	2.76	3.73
250.1	2.05	2.86	3.88
290.1	2.09	2.90	3.92
330.1	2.16	3.01	4.04
370.1	2.27	3.16	4.23
410.1	2.30	3.17	4.23
450.1	2.40	3.30	4.37
490.1	2.41	3.26	4.28
530.1	2.48	3.33	4.35
570.1	2.54	3.36	4.34
610.1	2.61	3.43	4.39
650.1	2.71	3.52	4.46
690.1	2.72	3.49	4.36
730.1	2.79	3.53	4.36
750.1	2.81	3.51	4.29
790.1	2.80	3.45	4.17
810.1	2.81	3.45	4.14
850.1	2.87	3.47	4.12
870.1	2.88	3.48	4.10
910.1	2.90	3.47	4.07
930.1	2.94	3.50	4.09
970.1	2.90	3.42	3.95
990.1	2.86	3.35	3.87
1030.1	2.89	3.37	3.86
1050.1	2.89	3.35	3.84
1090.1	2.84	3.26	3.71
1110.1	2.87	3.29	3.73
1150.1	2.90	3.29	3.72
1170.1	2.86	3.22	3.62
1210.1	2.89	3.24	3.63
1230.1	2.94	3.30	3.70
1270.1	2.95	3.27	3.63
1290.1	3.01	3.33	3.68
1330.1	3.15	3.45	3.79
1350.1	3.17	3.46	3.79

IF (OUT) (MHz)	IF VSWR @LO=1000.1MHz (:1) @LO (dBm)		
	+4	+7	+10
5.0	1.40	1.22	1.11
10.0	1.41	1.22	1.11
30.1	2.29	1.92	1.58
50.1	1.95	1.62	1.40
70.1	1.86	1.62	1.38
90.1	1.95	1.67	1.44
110.1	2.02	1.72	1.47
130.1	2.01	1.69	1.47
150.1	1.95	1.66	1.44
170.1	1.93	1.64	1.43
190.1	1.98	1.68	1.45
210.1	1.97	1.67	1.46
230.1	1.93	1.64	1.42
250.1	1.89	1.62	1.41
270.1	1.87	1.60	1.40
290.1	1.88	1.61	1.41
310.1	1.85	1.59	1.39
330.1	1.83	1.56	1.38
350.1	1.80	1.54	1.38
370.1	1.79	1.55	1.39
390.1	1.80	1.55	1.39
430.1	1.75	1.53	1.39
450.1	1.74	1.53	1.39
490.1	1.72	1.52	1.39
510.1	1.71	1.51	1.39
550.1	1.68	1.50	1.41
570.1	1.69	1.51	1.41
610.1	1.60	1.44	1.38
630.1	1.59	1.45	1.39
670.1	1.61	1.47	1.42
690.1	1.58	1.44	1.39
730.1	1.53	1.42	1.40
750.1	1.55	1.45	1.43
790.1	1.50	1.40	1.38
810.1	1.45	1.37	1.37
850.1	1.47	1.41	1.43
870.1	1.47	1.41	1.42
910.1	1.40	1.35	1.37
930.1	1.39	1.35	1.40
970.1	1.40	1.37	1.41
990.1	1.38	1.35	1.38

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Harmonics Tables

RF HARMONICS ORDER	(-dBm)	(-dBc)										
0	-	-	2	18	8	28	15	32	16	30	29	42
1	-	17	0	30	13	30	25	39	36	37	47	39
2	109	67	47	68	48	71	48	72	58	64	53	58
3	117	73	78	77	69	75	67	73	79	78	67	77
4	117	100	92	98	89	88	89	96	89	97	94	94
5	114	99	107	109	98	96	86	100	97	107	101	105
6	113	107	103	111	108	104	94	85	101	110	113	98
7	119	107	114	106	100	110	100	113	93	96	102	97
8	118	103	126	106	108	107	105	96	85	95	97	102
9	120	103	109	100	102	102	109	107	99	86	86	99
10	127	104	104	105	106	104	104	104	131	101	91	89
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions:
RF IN: 500.1 MHz; -14.00 dBm.
LO IN: 530.01 MHz; +7.00 dBm
IF OUT: 29.91 MHz; -21.04 dBm

RF HARMONICS ORDER	(-dBm)	(-dBc)										
0	-	-	12	28	19	39	25	42	28	44	44	64
1	-	17	0	29	13	32	26	42	37	41	52	45
2	100	58	38	52	38	71	41	63	50	64	45	55
3	111	53	53	70	50	61	48	51	54	57	53	55
4	113	73	78	93	62	72	63	72	56	78	72	66
5	118	77	77	76	60	70	58	69	59	73	67	80
6	118	86	86	84	78	75	70	74	67	86	71	88
7	114	86	86	92	81	87	77	84	78	92	83	87
8	112	104	107	106	104	100	97	92	91	95	87	89
9	124	105	99	109	103	108	108	103	93	96	89	99
10	113	106	118	106	107	105	114	104	115	101	96	92
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions:
RF IN: 500.1 MHz; -4.00 dBm.
LO IN: 530.01 MHz; +7.00 dBm
IF OUT: 29.91 MHz; -11.20 dBm

Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT.
2. + entry denotes harmonics are in (dBc) above IF OUTPUT.
3. RF Cal represent the Harmonics level of the RF input signal to the mixer.

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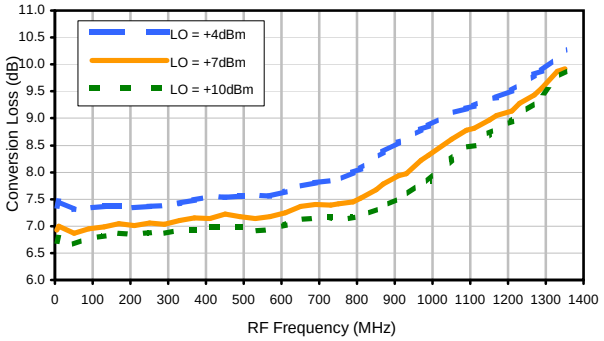
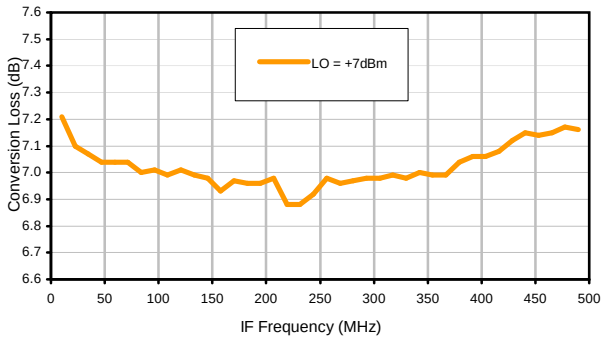
Typical Performance Curves

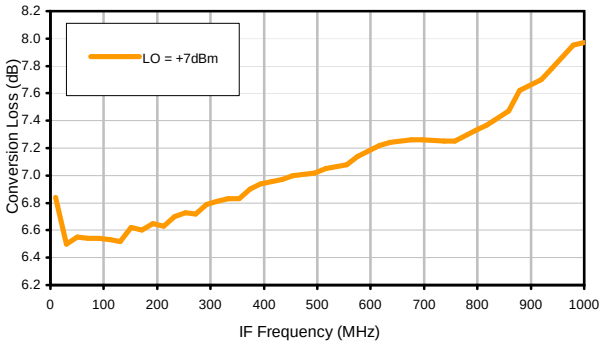
Conversion Loss @ IF=30MHz



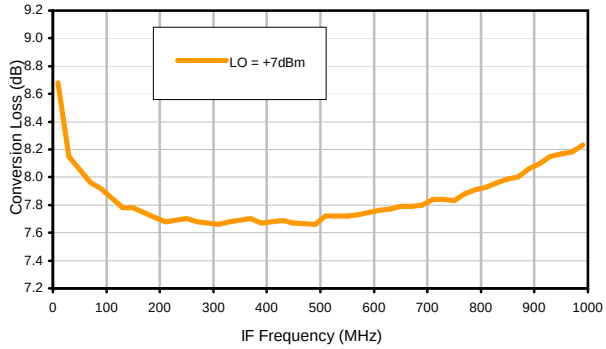
Conversion Loss vs. IF @ RF=500.1MHz



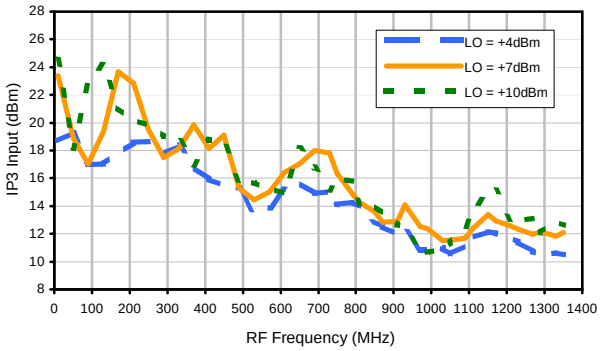
Conversion Loss vs. IF @ RF=10.1MHz



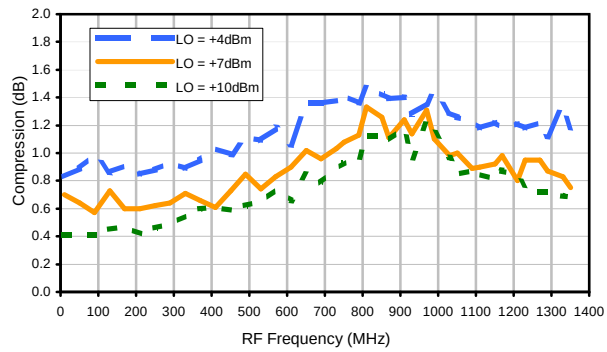
Conversion Loss vs. IF @ RF=1000.1MHz



IP3 Input



Compression @ RF IN=+1dBm



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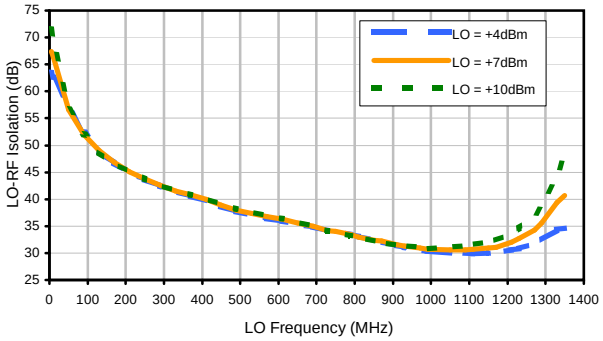
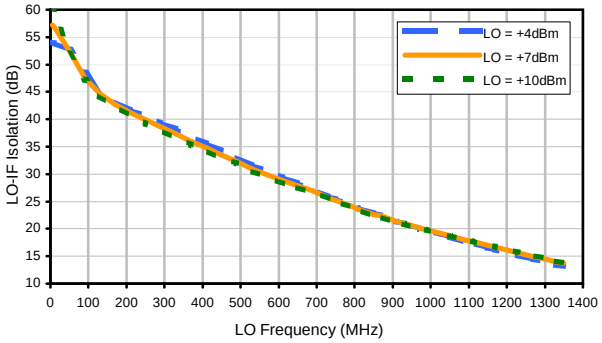
Typical Performance Curves

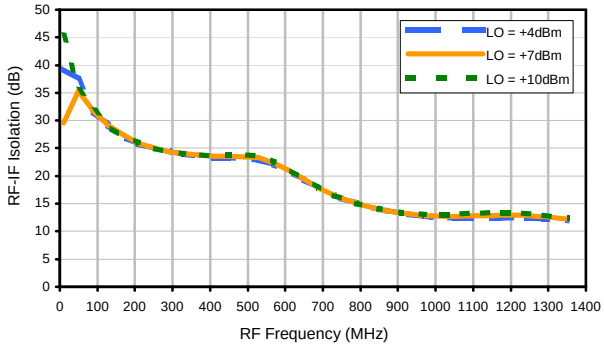
LO-RF Isolation



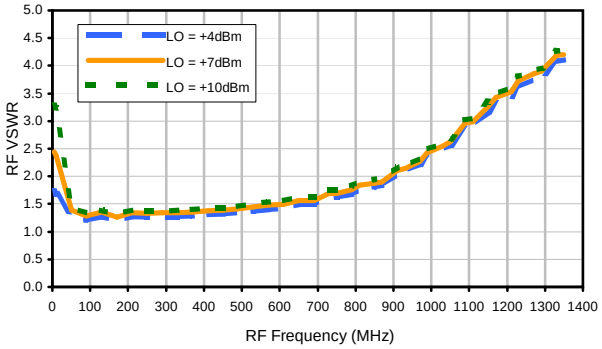
LO-IF Isolation



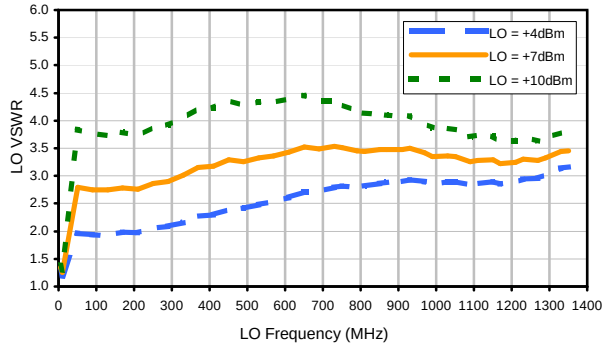
RF-IF Isolation



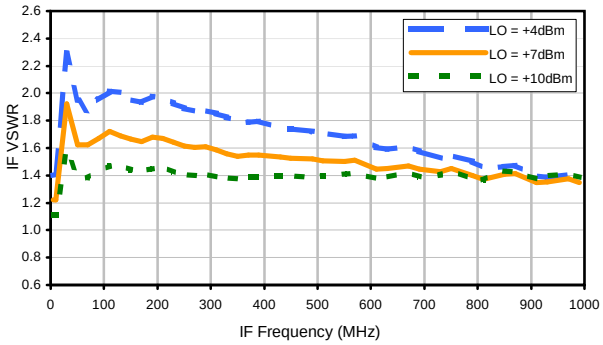
RF VSWR



LO VSWR



IF VSWR



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Harmonics Tables

RF HARMONICS ORDER	(-dBm)	(-dBc)										
0	-	-	2	18	8	28	15	32	16	30	29	42
1	-	17	0	30	13	30	25	39	36	37	47	39
2	109	67	47	68	48	71	48	72	58	64	53	58
3	117	73	78	77	69	75	67	73	79	78	67	77
4	117	100	92	98	89	88	89	96	89	97	94	94
5	114	99	107	109	98	96	86	100	97	107	101	105
6	113	107	103	111	108	104	94	85	101	110	113	98
7	119	107	114	106	100	110	100	113	93	96	102	97
8	118	103	126	106	108	107	105	96	85	95	97	102
9	120	103	109	100	102	102	109	107	99	86	86	99
10	127	104	104	105	106	104	104	104	131	101	91	89
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions:
RF IN: 500.1 MHz; -14.00 dBm.
LO IN: 530.01 MHz; +7.00 dBm
IF OUT: 29.91 MHz; -21.04 dBm

RF HARMONICS ORDER	(-dBm)	(-dBc)										
0	-	-	12	28	19	39	25	42	28	44	44	64
1	-	17	0	29	13	32	26	42	37	41	52	45
2	100	58	38	52	38	71	41	63	50	64	45	55
3	111	53	53	70	50	61	48	51	54	57	53	55
4	113	73	78	93	62	72	63	72	56	78	72	66
5	118	77	77	76	60	70	58	69	59	73	67	80
6	118	86	86	84	78	75	70	74	67	86	71	88
7	114	86	86	92	81	87	77	84	78	92	83	87
8	112	104	107	106	104	100	97	92	91	95	87	89
9	124	105	99	109	103	108	108	103	93	96	89	99
10	113	106	118	106	107	105	114	104	115	101	96	92
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

LO HARMONICS ORDER

Test conditions:
RF IN: 500.1 MHz; -4.00 dBm.
LO IN: 530.01 MHz; +7.00 dBm
IF OUT: 29.91 MHz; -11.20 dBm

Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT.
2. + entry denotes harmonics are in (dBc) above IF OUTPUT.
3. RF Cal represent the Harmonics level of the RF input signal to the mixer.

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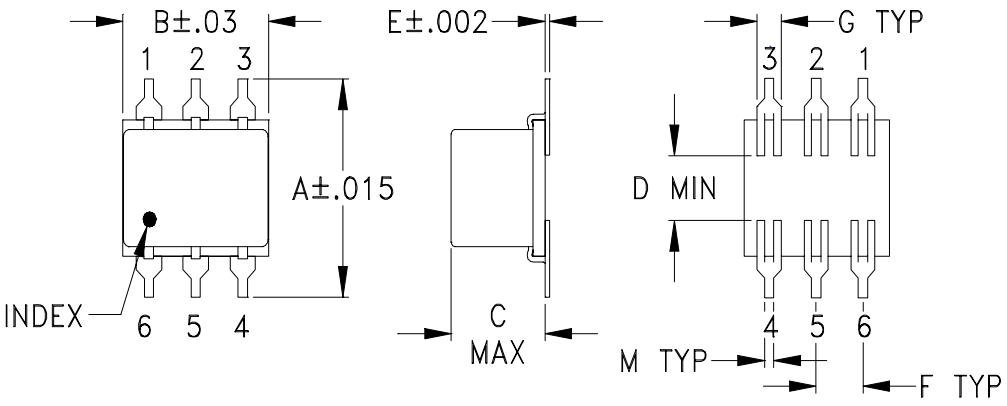
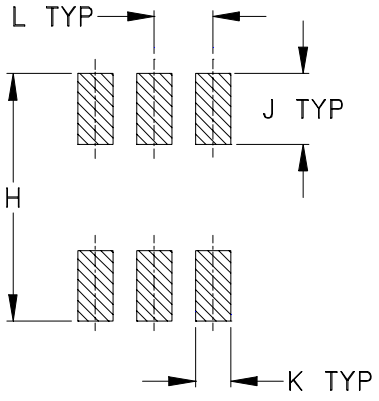
Case Style QQQ

QQQ130 (non-waterproof)
QQQ828 (washable)

Outline Dimensions



PCB Land Pattern



Suggested Layout,
Tolerance to be within ±.002

CASE#	A	B	C	D	E	F	G	H	J	K	L	M	WT, GRAM
QQQ130	.400 (10.16)	.31 (7.87)	.200 (5.08)	.10 (2.54)	.010 (.25)	.100 (2.54)	.050 (1.27)	.420 (10.67)	.120 (3.05)	.060 (1.52)	.100 (2.54)	.020 (.51)	.55
QQQ828			.050 (1.27)										.20

Dimensions are in inches (mm). Tolerances: 2 Pl. ± .01; 3 Pl. ± .005

Notes:

1. Case material: Ceramic.
2. Termination finish:
   For RoHS Case Styles: Tin plate over Nickel plate.
   For RoHS-5 Case Styles: Tin-Lead plate.

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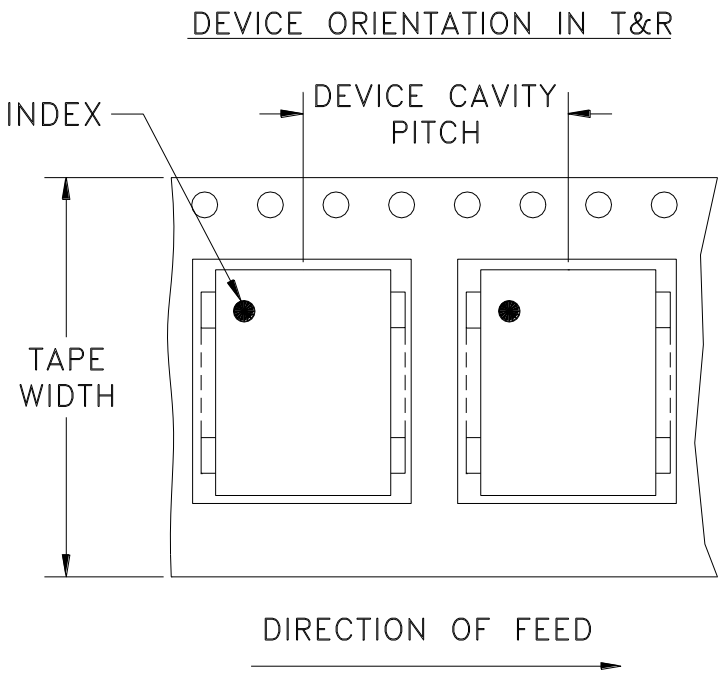
Tape & Reel Packaging TR-F10



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel
24	16	7	10,20,50,100
		13	200,500

Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

Go to: www.minicircuits.com/pages/pdfs/tape.pdf

Note: Please consult individual model data sheet to determine device per reel availability.

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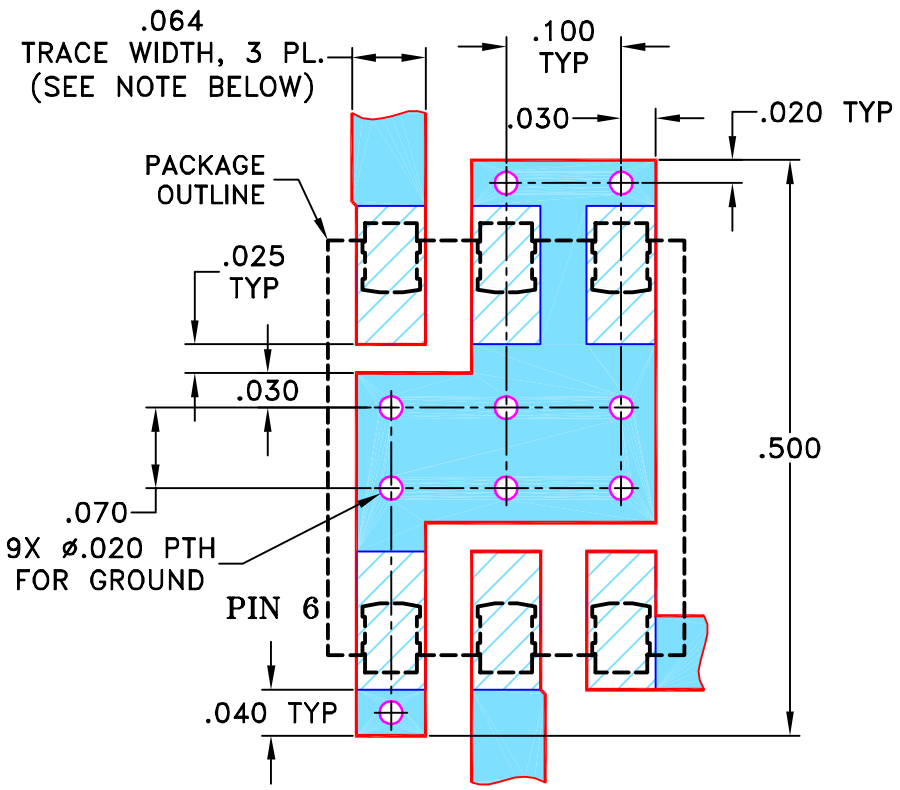
THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M82272	NEW RELEASE	08/02/02	AV	DJ
A	M102713	UPDATED NOTES	01/14/06	GF	IL

SUGGESTED MOUNTING CONFIGURATION FOR QQQ569 CASE STYLE, "w" PIN CONNECTION



NOTES: 1.TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS 0.030" ± 0.002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.

2.BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)

DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

UNLESS OTHERWISE SPECIFIED		INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN	AV	07/19/02
TOLERANCES ON:	CHECKED	WL	08/02/02
2 PL DECIMALS ±	APPROVED	DJ	08/02/02
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

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ASHEETA1.DWG REV:A DATE:01/12/95

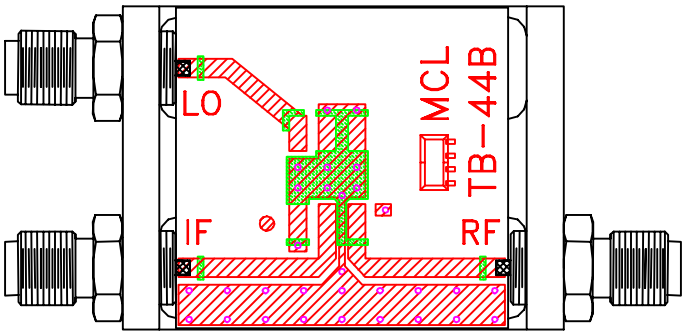
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

PL, w, QQQ569, LRMS-J, TB-44

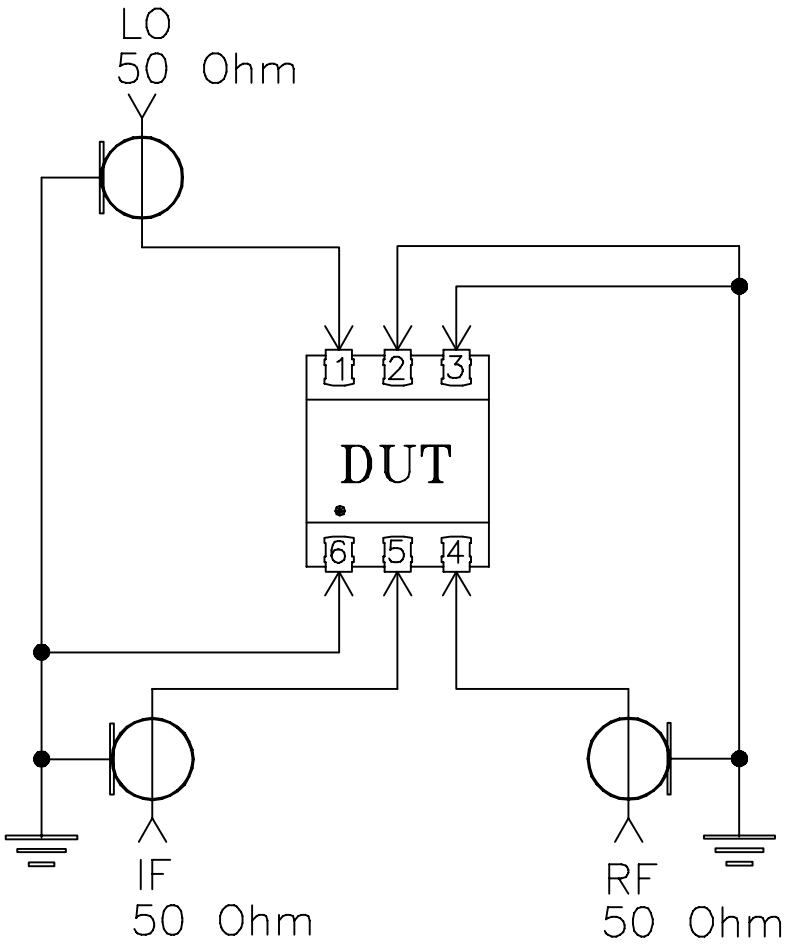
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-083	A

FILE:	SCALE:	SHEET:
98PL083	6:1	1 OF 1

Evaluation Board and Circuit



TB-44+



Schematic Diagram

Notes:

1. SMA Female connectors.
2. PCB Material: Rogers RO4350 or equivalent, Dielectric Constant=3.5, Thickness=.030 inch.

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Environmental Specifications ENV02T1

All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

Specification	Test/Inspection Condition	Reference/Spec
Operating Temperature	-40° to 85°C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet
Humidity	90 to 95% RH, 240 hours, 50°C	MIL-STD-202, Method 103, Condition A, Except 50°C and end-point electrical test done within 12 hours
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C
Solder Reflow Heat	Sn-Pb Eutetic Process: 225°C peak Pb-Free Process 245° - 250°C peak	J-STD-020, Table 4-1, 4-2 and 5-2, Figure 5-1
Solderability	10X Magnification	J-STD-002, 95% Coverage
Vibration (High Frequency)	20g peak, 10-2000 Hz, 12 times in each of three perpendicular directions (total 36)	MIL-STD-202, Method 204, Condition D
Mechanical Shock	50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes	MIL-STD-202, Method 213, Condition A
Marking Resistance to Solvents	Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C; distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C	MIL-STD-202, Method 215

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